IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

James O'Neil et al.

Application No. 10/697,618

Filed: October 29, 2003

For: Method of Forming Thin-Film Electrodes

Group Art Unit: 1795

Examiner: McDonald, Rodney G.

Confirmation No.: 7287

REQUEST FOR REHEARING UNDER 37 C.F.R. § 41.52

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Decision on Appeal issued September 28, 2009 in the above-identified patent application (the "Decision"), Appellant hereby requests rehearing under 37 C.F.R. §41.52. Appellant believes the Decision by the Board of Patent Appeals and Interferences (the "Board") to have been clearly in error for at least the following reasons.

While reversing the rejections made by the Examiner, the Decision raised a New Ground of Rejection under 37 C.F.R. § 41.50(b). That rejection as framed by the Decision is

that claims 1-11, 15-26 and 30-37 are improper under 35 U.S.C. §112, second paragraph, "as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention." (Decision, p. 4). This rejection is based on the conclusion of the Decision that: "A person of ordinary skill in the art designing a thin-film electrode would not appreciate when the claimed invention has been infringed." (Decision, p. 8). Appellant respectfully, but very strongly, disagrees.

As an initial matter, Appellant notes that, because a new ground of rejection was made, Appellant may submit new arguments pursuant to 37 C.F.R. § 41.52(a)(3). Accordingly, Appellant has filed herewith a Declaration under 37 C.F.R. § 1.132 (the "Declaration") to provide an evidentiary basis for several facts alleged herein.

Turning to the merits, claim 1 of the above-identified patent application, for example, reads as follows.

> 1. (original) A method of forming a thin-film fuel cell electrode, comprising:
> providing a substrate and at least one deposition device;
> developing a deposition characteristic profile having at least one porous layer based on pre-determined desired electrode properties; and
> forming a film in accordance with said deposition characteristic profile by depositing material from said deposition device while varying a relative position of said substrate in relation to said deposition device with respect to at least a first axis.

The Board's Decision does not address, and contains no findings with regard to, what is within the level of ordinary skill in this art at the time the invention was made. Had the Board considered that critical issue which must underlie any finding of unpatentability, the new ground of rejection would likely not have been made.

Appellant respectfully submits that one of ordinary skill in this art would appreciate that an electrode may have any of a vast range of desired properties depending on the specific environment and application in which that electrode is to be used. It is impossible, therefore,

to prophetically specify in the abstract what those properties will be. However, once the operating environment of an electrode has been specified, one of skill in the art would readily be able to list "pre-determined desired electrode properties" as claimed for that specific application. Clearly, one of skill in the art will generally know or be able to determine with routine experimentation what makes a good or better electrode once the operating environment has been specified. (*See* Declaration, p. 2).

Nevertheless, a Decision on Appeal issued September 28, 2009 in the above-identified patent application (the "Decision") makes the following statements.

> Appellants' claims are directed to a method of forming a thin-film fuel cell electrode, comprising, inter alia, "developing a deposition characteristic profile having at least one porous layer based on pre- determined desired electrode properties." The Specification provides a general discussion of the variables of a process for producing a thin-film electrode and film characteristics such as thickness, composition, gradient, and porosity. However, there is no description of what process variables or film characteristics are desirable or acceptable.

(Decision, pp. 6-7).

The Decision then concludes that "the Specification does not provide a description of the desired compositional and/or morphological characteristics of the electrode." (Decision, p. 7).

Again, the "pre-determined desired electrode properties" recited in claim 1 will be specific to the environment and application in which that electrode is to be used. While such properties cannot be listed without knowing the specific environment and application in which that electrode is to be used, one of skill in the art will be able to determine the claimed "pre-determined desired electrode properties" once the intended operating environment of that electrode are specified. Thus, any complaint that Appellant's specification does not prophetically specify "pre-determined desired electrode properties" for an unknown operating environment is unreasonable.

Moreover, the Board's Decision improperly overlooks the examples given in the specification in this regard. Appellant's specification uses, as an example, the formation of a cathode or anode electrode for use in a fuel cell. In this regard, the specification does, in fact, specify the desired compositional and/or morphological characteristics of such electrodes, contrary to the assertions in the Decision.

Appellant's specification states that "[v]arying the pore size, porosity, layer thicknesses, and overall film thickness of the electrodes (910, 920) may significantly improve the performance of the fuel cell (900)." (Appellant's specification, paragraph 0046).

Appellant's specification then clearly explains that these compositional characteristics, e.g., porosity, pore size, layer thickness, etc., determine desired characteristics of the electrodes such as catalytic activity, stability during thermal cycling and matching of thermal expansion coefficients (TCEs).

For example, Appellant's specification explains that porosity impacts surface area, and that surface area and internal strain affect catalytic activity. (Appellant's specification, paragraph 0032). Additionally, "[m]odulation of the porosity enables improved mechanical performance of the films. Adjusting the film composition in concert with film porosity modulation improves catalytic reaction rate and mobility of the active species because surface mobility rates are significantly higher than bulk mobility rates." (Appellant's specification, paragraph 0042). Moreover, with the claimed method, any of these compositional or morphological characteristics can be varied throughout the electrode to produce precisely a desired gradient of such characteristics. (Appellant's specification, paragraph 0029).

Appellant's specification further specifies that volumetric energy, in addition to stability through thermal cycling and matching of thermal coefficients of expansion, is a

desirable characteristic that can be controlled using the claimed method. (*See* Appellant's specification, paragraphs 0044 and 0046).

> [0038] As described, the present method provides a way for thin film electrodes to be made with precise control of compositional and morphological gradients through the film thickness. Such films have superior volumetric energy (energy per 1 μm of thickness) as anode and cathode of SOFC. Stability of anode (cermet) to red-ox cycling is also improved due to the presence of "nano-chambers" connected by less porous material (in z-direction). As a result, thin-film SOFC performance may be up to 850 mW/cm^2 or higher. In addition, the thin-film architecture by definition requires less material than other solutions.

(Appellant's specification, paragraph 0038).

Thus, it is simply incorrect to hold, as does the Board's Decision, that "the Specification does not provide a description of the desired compositional and/or morphological characteristics of the electrode." (Decision, p. 7). With regard to the example of anode and cathode electrodes in a fuel cell, the desired compositional variables and characteristics are discussed at length.

Beyond this, the specification cannot reasonable describe desired characteristics for every electrode in every possible operating environment. However, Appellant reasonably maintains that such characteristics would be readily apparent to those ordinarily skilled in the art once that operating environment is specified. (*See* Declaration, p. 2).

The Decision next states the following. "The Specification does not provide a description of the components utilized for deposition (e.g., copper, aluminum, or titanium), or the resulting properties of the deposited film (e.g., film thickness, gradient or porosity)." (Decision, p. 7). In response, Appellant directs attention to paragraph 0045 of the specification which reads as follows.

> Suitable anode materials may include nickel, platinum, Ni- Yttria Stabilized Zirconia (YSZ), Cu-YSZ, Ni- Samarium Doped Ceria (SDC), Ni- Gadolinium Doped Ceria (GDC), Cu-SDC, Cu-GDC. Suitable cathode materials may include silver, platinum, samarium strontium cobalt oxide (SSCO, $Sm_xSr_yCoO_{3-\delta}$), barium lanthanum cobalt oxide (BLCO, $Ba_xLa_yCoO_{3-\delta}$), gadolinium strontium cobalt oxide (GSCO,

> $Gd_xSr_yCoO_{3-\delta}$), lanthanum strontium manganite (LSM, $La_xSr_yMnO_{3-\delta}$) and lanthanum strontium cobalt ferrite ($La_wSr_xCo_yFe_zO_{3-\delta}$) and mixtures thereof.

(Appellant's specification, paragraph 0045).

The Decision next argues as follows.

> The Specification also does not provide a description as to how the desired compositional and/or morphological characteristics are determined. That is, Appellants have not defined in the Specification how to determine the compositional and/or morphological characteristics related to a predicated outcome. Moreover, there is no discussion as to how to adjust the apparatus to achieve desired or acceptable results.

(Decision, p. 7).

Appellant respectfully submits that, given the benefit of Appellant's specification, how to adjust the apparatus to achieve the desired characteristics is a routine matter within the skill of one skilled in the art. Each tool set for depositing material to form an electrode as in the disclosed and claimed method will require separate adjustment to achieve a result. Even two identical tool sets may, because of manufacturing variations or environmental factors due to different locations, require different input to produce approximately the same result. Thus, Appellant's specification does not attempt, unreasonably, to specify how to adjust the parameters of all possible apparatus to achieve desired results. Given the disclosed method, however, such would be within the skill of one ordinarily skilled in the art. (*See* Declaration, p. 3).

The essence of the Decision's new ground of rejection under 35 U.S.C. § 112, second paragraph, is found in the following conclusion. "A person of ordinary skill in the art designing a thin-film electrode would not appreciate when the claimed invention has been infringed. *See Advantage Dental Prodx,* 309 F.3d at 779-80." (Decision, p. 8). This is clearly incorrect.

Referring again to claim 1, Appellant claims:

> A method of forming a thin-film fuel cell electrode, comprising:
> providing a substrate and at least one deposition device;
> developing a deposition characteristic profile having at least one porous layer based on pre-determined desired electrode properties; and
> forming a film in accordance with said deposition characteristic profile by depositing material from said deposition device while varying a relative position of said substrate in relation to said deposition device with respect to at least a first axis.

Thus, the claim is infringed if a deposition characteristic profile is produced based on pre-determined desired electrode properties and a film is then formed in accordance with that profile as specified in claim 1. There does not appear to be any lack of clarity or indefiniteness in claim 1. It is unclear why there would be any confusion in determining when this claim had been infringed.

Therefore, the metes and bounds of Appellant's claims are definite. The Board's finding in this regard is conclusory and lacks reasonable support. Consequently, Appellant hereby requests reconsideration and withdrawal of the Decision. Additionally, in view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Rejection of May 18, 2007 is respectfully requested.

Respectfully submitted,

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